Form 5

HKCEE 1985
Mathematics II

85 1. $\dfrac{2}{1+x} - \dfrac{2}{1-x} - \dfrac{4x}{x^2-1}$

A. $\dfrac{1}{1-x}$
B. $\dfrac{1}{1+x}$
C. $\dfrac{1-7x}{x^2-1}$
D. $\dfrac{1-7x}{1-x^2}$
E. $\dfrac{3x+1}{1-x^2}$

85 2. $\dfrac{\dfrac{b}{a}-\dfrac{a}{b}}{\dfrac{1}{a}-\dfrac{1}{b}} =$

A. $a+b$
B. $a-b$
C. $-a+b$
D. $-a-b$
E. $\dfrac{1}{a}+\dfrac{1}{b}$

85 3. If $\dfrac{ab}{ka+b} = \dfrac{1}{k}$, then $b =$

A. $\dfrac{a}{a-k}$
B. $\dfrac{ka}{ka-1}$
C. $\dfrac{ka}{1-ka}$
D. $\dfrac{k^2a}{a-k}$
E. $\dfrac{k^2a}{k-a}$

85 4. $(x+y)^{-1}(x^{-2}-y^{-2}) =$

A. $\dfrac{1}{x^3} - \dfrac{1}{y^3}$
B. $\dfrac{1}{x^2y} - \dfrac{1}{xy^2}$
C. $\dfrac{1}{xy^2} - \dfrac{1}{x^2y}$
D. $\dfrac{1}{x^2} - \dfrac{1}{y^2}$
E. $\dfrac{1}{x^2y} + \dfrac{1}{xy^2}$

85 5. If $a - \sqrt{b^2+c^2} = d$, then $c =$

A. $d - a + b$
B. $a - d - b$
C. $\pm\sqrt{d^2 - a^2 + b^2}$
D. $\pm\sqrt{a^2 - d^2 - b^2}$
E. $\pm\sqrt{(a-d)^2 - b^2}$

85 6. The L.C.M. of $2a^2 - 2b^2$ and $a^3 - 2a^2b + ab^2$ is

A. $a - b$
B. $(a - b)(a + b)$
C. $2a(a - b)(a + b)$
D. $2a(a - b)^2(a + b)$
E. $2a(a - b)^3(a + b)$

85 7. Let a and b be constants. If $3x^3 - ax^2 + 5x - 3b$ is divisible by $x + 3$ then $3a + b =$

A. –32
B. –22
C. 22
D. 32
E. It cannot be determined

85 8. $\log_{10}(a^2 - b^2) =$

A. $\dfrac{\log_{10} a}{\log_{10} b}$
B. $2\log_{10}(a - b)$
C. $2\log_{10}a - 2\log_{10}b$
D. $\log_{10}(a + b) + \log_{10}(a - b)$
E. $(\log_{10}a + \log_{10}b)(\log_{10}a - \log_{10}b)$

85 9. If α and β are roots of x2 + 2x − 4 = 0, then $2^{\alpha}.2^{\beta} =$

A. $\dfrac{1}{16}$
B. $\dfrac{1}{4}$
C. 2
D. 4
E. 16

85 10. The second term and the fifth term of a geometric progression are −12 and $40\dfrac{1}{2}$ respectively. The first term is

A. $1\dfrac{1}{2}$
B. 6
C. 8
D. 15
E. 18

85 11. If $a : b = 1 : 2$ and $b : c = 1 : 3$, then $a + b : b + c =$

A. 1 : 5
B. 2 : 3
C. 3 : 4
D. 3 : 5
E. 3 : 8

85 12. A hawker bought 120 apples and the cost was \$90. It was found that $\dfrac{1}{8}$ of the apples were rotten and could not be sold. He sold the rest at \$1 each. What percentage of the cost was his profit?

A. $11\dfrac{1}{9}\%$
B. $14\dfrac{2}{7}\%$
C. $16\dfrac{2}{3}\%$
D. $28\dfrac{4}{7}\%$
E. $33\dfrac{1}{3}\%$

85 13. The marked price of a book is double that of its cost. In a sale, what percentage discount was given if the profit made was 20% of the cost?

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%

85 14. John spends 40 minutes to walk from his home to school. If he increases his walking speed by 2 km/h, then it takes only 30 minutes. What is the distance between John's home and his school?

A. 1 km
B. 4 km
C. 6 km
D. 8 km
E. 12 km

85 15. 60% of the students in a school are boys. 70% of the boys and 40% of the girls wear glasses. If 696 students wear glasses, how many students are there in the school?

A. 1200

B. 1050
C. 868
D. 849
E. 800

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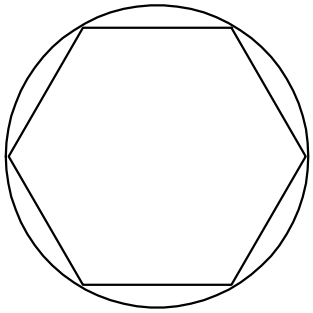
16.



In the figure, a regular hexagon of side 2 cm is inscribed in a circle. The area of the circle is greater than the area of the hexagon by

A. $(3\pi - 6)$ cm^2
B. $(3\pi - 3\sqrt{3})$ cm^2
C. $(4\pi - 6)$ cm^2
D. $(4\pi - 3\sqrt{3})$ cm^2
E. $(4\pi - 6\sqrt{3})$ cm^2

85
17. $\tan\theta\left(\frac{1}{\sin\theta} - \sin\theta\right) =$

A. 1
B. $\cos\theta$
C. $\sin\theta$
D. $\frac{1}{\cos\theta}$
E. $\frac{1}{\sin\theta}$

85
18. If $\tan\theta = \frac{2ab}{a^2 - b^2}$ and $0^o < \theta < 90^o$, then $\cos\theta =$

A. $\frac{a^2 + b^2}{a^2 - b^2}$
B. $\frac{a^2 - b^2}{a^2 + b^2}$
C. $\frac{a^2 - b^2}{\sqrt{a^2 + b^2}}$
D. $\frac{\sqrt{a^2 - b^2}}{a^2 + b^2}$
E. $\sqrt{\frac{a^2 - b^2}{a^2 + b^2}}$

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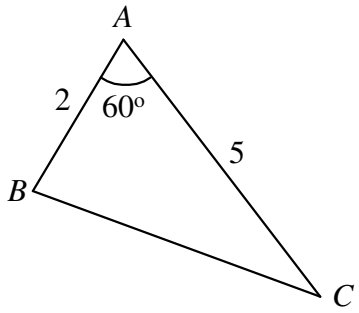
19.



In the figure, $AB = 2$ and $AC = 5$, $BC =$

A. $\sqrt{39}$
B. $\sqrt{29}$
C. $\sqrt{24}$
D. $\sqrt{20}$
E. $\sqrt{19}$

85
20. In ΔABC, $\angle A = 30^o$, $AB = 6$ cm. If the area of ΔABC is 15 cm^2, $AC =$

A. 2.5 cm
B. 5 cm
C. 10 cm
D. 12 cm
E. 15 cm

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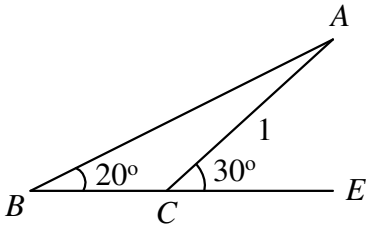
21.



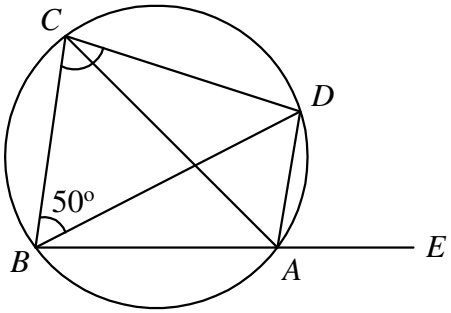
In the figure, BCX is a straight line. $AC = 1$, $AB =$

A. $2\sin 20^o$
B. $2\cos 20^o$
C. $\sqrt{2}\cos 20^o$

D. $\dfrac{1}{2\sin 20^{\circ}}$

E. $\dfrac{\sqrt{3}}{2\sin 20^{\circ}}$

85 22.



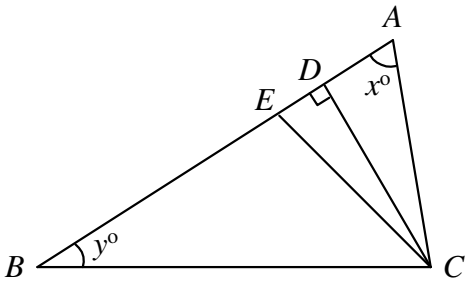
In the figure, $ABCD$ is a cyclic quadrilateral. BA is produced to E. DA bisects $\angle CAE$. $\angle BCD =$

A. 40°
B. 45°
C. 50°
D. 55°
E. 65°

85 23. The exterior angles of a pentagon are x°, $2x^{\circ}$, $3x^{\circ}$, $4x^{\circ}$, $5x^{\circ}$. The smallest interior angle of the pentagon is

A. 120°
B. 60°
C. 48°
D. 36°
E. 24°

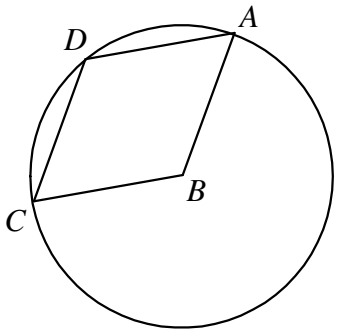
85 24.



In the figure, A, D, E and B lie on a straight line. CE bisects $\angle ACB$ and $CD \perp AB$. $\angle DCE =$

A. $\dfrac{1}{2}(x^{\circ} - y^{\circ})$
B. $\dfrac{1}{2}(x^{\circ} + y^{\circ})$
C. $x^{\circ} - y^{\circ}$
D. $90^{\circ} - \dfrac{1}{2}(x^{\circ} + y^{\circ})$
E. $90^{\circ} - (x^{\circ} - y^{\circ})$

85 25.



In the figure, $ABCD$ is a rhombus B is the centre of the circle. $\angle ABC =$

A. 105°
B. 120°
C. 130°
D. 135°
E. 150°

85 26. The distance between $(1 - k, k)$ and $(2, 1 + k)$ is $\sqrt{26}$, $k =$

A. 4
B. 6
C. –4 or 6
D. 4 or –6
E. –4 or –6

85 27. The equation of the perpendicular bisector of the line joining (1, 2) and (7, 4) is

A. $3x + y + 15 = 0$
B. $3x + y - 15 = 0$
C. $3x - y + 9 = 0$
D. $3x - y - 9 = 0$
E. $x + 3y - 13 = 0$

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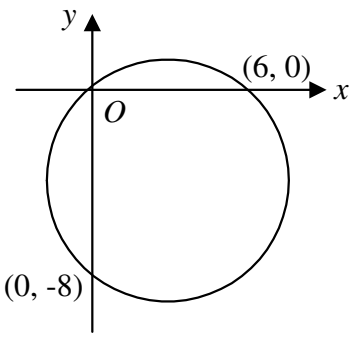
28.



In the figure, the circle passes through (0, 0) and cuts the two axes at (6, 0) and (0, –8). Its equation is

A. $x^2 + y^2 - 3x + 4y = 0$
B. $x^2 + y^2 + 3x - 4y = 0$
C. $x^2 + y^2 + 6x - 8y = 0$
D. $x^2 + y^2 - 6x + 8y = 0$
E. $x^2 + y^2 - 6x - 8y = 0$

85
29. The equation of a circle is $x^2 + y^2 - 4x - 5 = 0$. Which of the following is/are true?

I. The circle passes through the origin.
II. The centre lies on the x-axis.
III. The line $x - 5 = 0$ touches the circle.

A. II only
B. III only
C. I and II only
D. II and III only
E. I, II and III

85
30.

Class mid-value	Frequency
$m - 8$	3
$m - 4$	1
m	2
$m + 4$	6

The mean of the above distribution is

A. $m - \frac{1}{3}$
B. $m - \frac{1}{2}$
C. $m - 2$
D. $m - 4$
E. m

85
31. There are four balls, numbered 1, 2, 5 and 10 in a bag. If 2 balls are taken out at random, the probability that the sum of the numbers on the two balls drawn is greater than or equal to 7 is

A. $\frac{1}{2}$
B. $\frac{5}{8}$
C. $\frac{2}{3}$
D. $\frac{3}{4}$
E. $\frac{5}{6}$

85
32. Two dice are thrown. The probability of getting at least one "6" is

A. $\frac{1}{6}$
B. $\frac{1}{3}$
C. $\frac{11}{36}$
D. $\frac{25}{36}$
E. $\frac{35}{36}$

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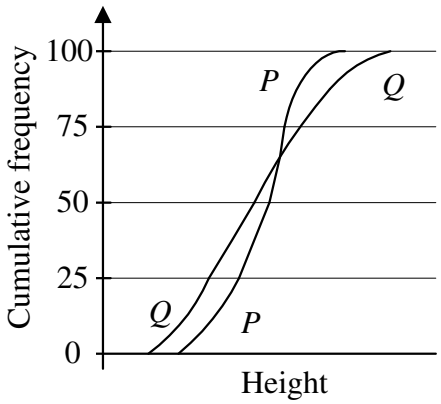
33.



In the figure, P and Q are the cumulative frequency curves for the heights of two groups of students, each having 100 students. Which of the following must be true?

I. range of P < range of Q
II. median of P < median of Q
III. the 3rd quartile of P < the 3rd quartile of Q

A. I only
B. II only
C. I and II only
D. I and III only
E. I, II and III

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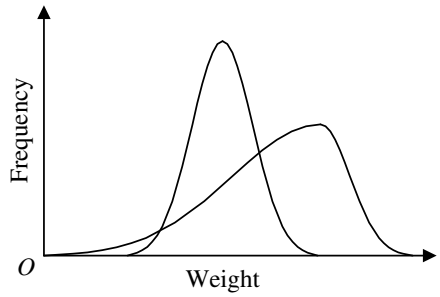
34.



In the figure, P and Q are curves showing the distribution of weights of students in two schools, each having the same number of students. Which of the following must be true?

I. standard deviation of P > standard deviation of Q
II. mode of P > mode of Q
III. median of P > median of Q

A. I only
B. I and II only
C. I and III only
D. II and III only
E. I, II and III

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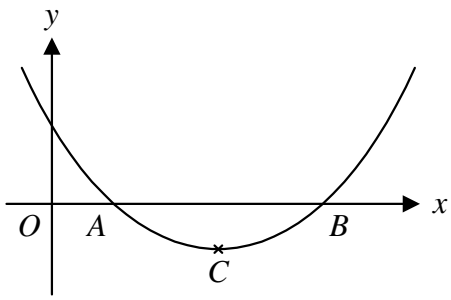
35.



In the figure, the equation of the curve is $y = (x - 2)^2 - 1$. The curve intersects the x-axis at A and B. C is the vertex of the curve. The area of ΔABC is

A. 1
B. 1.5
C. 2
D. 2.5
E. 3

85
36. Which of the following is the solution of $(x - 1)(x - 3) \leq 0$ and $x - 2 \leq 0$

A. $x \leq 2$
B. $x \leq 3$
C. $2 \leq x \leq 3$
D. $1 \leq x \leq 2$
E. $1 \leq x \leq 3$

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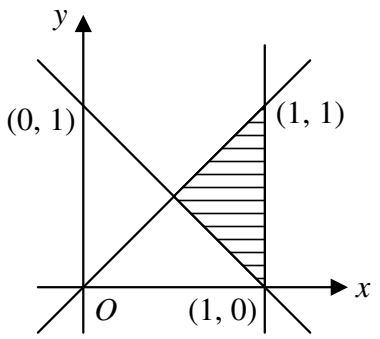
37.



Which of the following systems of inequalities determine the shaded region in the figure?

A. $\begin{cases} x \geq 1 \\ x + y \geq 1 \\ x \geq y \end{cases}$

B. $\begin{cases} x \geq 1 \\ x + y \leq 1 \\ x \geq y \end{cases}$

C. $\begin{cases} x \leq 1 \\ x + y \leq 1 \\ x \leq y \end{cases}$

D. $\begin{cases} x \leq 1 \\ x + y \leq 1 \\ x \geq y \end{cases}$

E. $\begin{cases} x \leq 1 \\ x + y \geq 1 \\ x \geq y \end{cases}$

85 38. If $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$ are in geometric progression, then which of the following is true?

A. $b^2 = ac$

B. $b^2 = \frac{1}{ac}$

C. $b^2 = \frac{a+c}{2}$

D. $b^2 = \frac{a+c}{2ac}$

E. $b^2 = \frac{2ac}{a+c}$

85 39. Three distinct numbers x, y and z are in arithmetic progression. Which of the following is/are also in arithmetic progression?

I. $x + 10, y + 10, z + 10$
II. $10x, 10y, 10z$
III. x^2, y^2, z^2

A. I and II only
B. I and III only
C. II and III only
D. I, II and III
E. None of I, II and III

85 40. If $f(2x) = 8x^3 + 4x$, then $f(3a) =$

A. $9a^3 + 6a$
B. $12a^3 + 6a$
C. $27a^3 + 6a$
D. $108a^3 + 6a$
E. $216a^3 + 12a$

85 41. A number is first reduced by $p\%$ and then increased by $x\%$. If the number so obtained is the same as the original number then $x =$

A. p
B. $\frac{p}{100}$
C. $\frac{p}{1-p}$
D. $\frac{100}{100-p}$
E. $\frac{100p}{100-p}$

85 42. The length and width of a cuboid are each increased by 10% and the height remains unchanged. The percentage increase in volume is

A. 10%
B. 20%
C. 21%
D. 24%
E. 33%

85 43. A cone of base radius $2r$ cm and height h cm has a volume of 60 cm^3. The volume of a cylinder of base radius r cm and height $4h$ cm is

A. 60 cm^3
B. 120 cm^3
C. 180 cm^3
D. 240 cm^3

E. $360\ cm^3$

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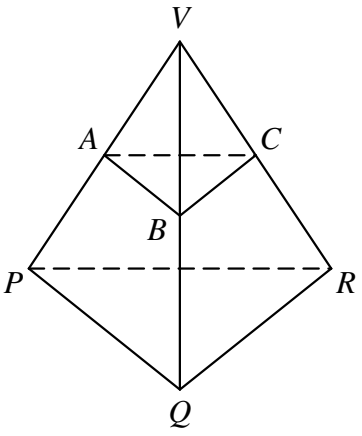
44.



In the figure, the volumes of the pyramids *VABC* and *VPQR* are 27 cm^3 and 64 cm*3* respectively. Planes *ABC* and *PQR* are parallel.
Area of ΔABC : Area of ΔPQR =

A. $\sqrt{27} : \sqrt{64}$
B. $\sqrt{37} : \sqrt{64}$
C. 3 : 4
D. 9 : 16
E. 27 : 64

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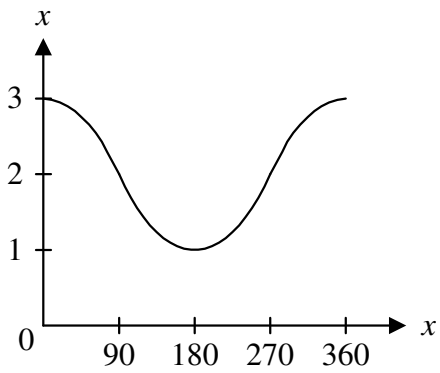
45.



The figure shows the graph of

A. $y = 3\cos x^o,\ 0 \le x \le 360$
B. $y = 3\sin x^o,\ 0 \le x \le 360$
C. $y = 2 + \sin x^o,\ 0 \le x \le 360$
D. $y = 2 + \cos x^o,\ 0 \le x \le 360$
E. $y = 3 + \sin x^o,\ 0 \le x \le 360$

85
46. If $0^o \le \theta \le 360^o$, then the largest value of $2\sin 2\theta + \cos 2\theta + 2$ is

A. 1
B. 2
C. 3
D. 4
E. 5

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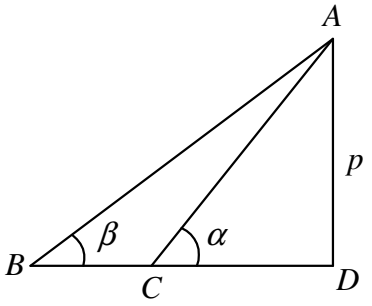
47.



In the figure, *BCD* is a straight line *AD* = *p*, then *BC* =

A. $p \tan(\beta - \alpha)$
B. $p(\tan \alpha - \tan \beta)$
C. $p(\tan \beta - \tan \alpha)$
D. $p(\frac{1}{\tan \alpha} - \frac{1}{\tan \beta})$
E. $p(\frac{1}{\tan \beta} - \frac{1}{\tan \alpha})$

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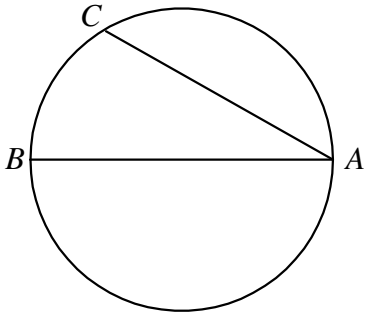
48.



In the figure, *AB* is a diameter of the circle *ABC*. If arc *AC* has the same length as *AB*, then $\angle CAB$ =

A. $\frac{\pi}{2}$ radians
B. $(\frac{\pi}{2} - \frac{1}{2})$ radians
C. $(\frac{\pi}{2} - 1)$ radians

D. $(\frac{\pi}{2} - 2)$ radians

E. $(\pi - \frac{1}{2})$ radians

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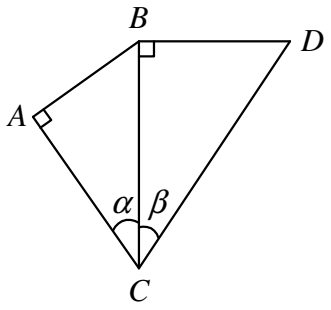
49.



In the figure, $\angle CAB = \angle CBD = 90^o$. $BC = 2$. The area of quadrilateral $ABCD$ =

A. $2\sin(\alpha + \beta)$
B. $2(\tan\alpha + \tan\beta)$
C. $2(\sin\alpha\cos\alpha + \sin\beta\cos\beta)$
D. $2(\tan\alpha + \sin\beta\cos\beta)$
E. $2(\sin\alpha\cos\alpha + \tan\beta)$

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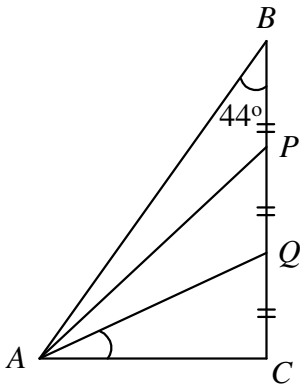

In the figure, $\angle C = 90^o$. P and Q are points on BC such that $BP = PQ = QC$. $\angle CAQ$ =

A. 30^o
B. 25^o
C. 22^o
D. 20^o
E. 15^o

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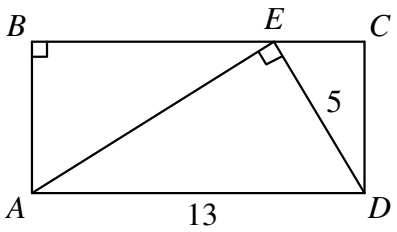
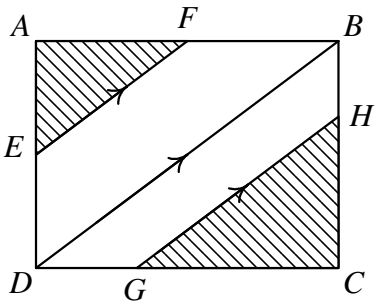
51.



In the figure, $ABCD$ is a rectangle. E is a point on BC such that $\angle AED = 90^o$. $AD = 13$ and $DE = 5$. The area of $ABCD$ =

A. 30
B. 52
C. 60
D. 65
E. 120

85
52.



In the figure, $ABCD$ is a rectangle E, F, G and H are points on the four sides such that EF // DB // GH. $AF = FB$ and $HC = 2BH$. What fraction of the area of $ABCD$ is shaded?

A. $\frac{13}{36}$
B. $\frac{5}{12}$
C. $\frac{25}{36}$
D. $\frac{25}{72}$
E. $\frac{47}{72}$

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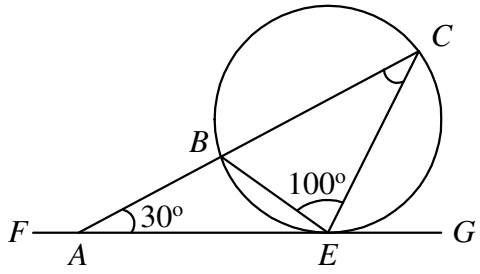
53.



In the figure, FG touches the circle at E. The chord CB is produced to meet FG at A. $\angle ACE =$

A. 10^o
B. 20^o
C. 25^o
D. 30^o
E. 35^o

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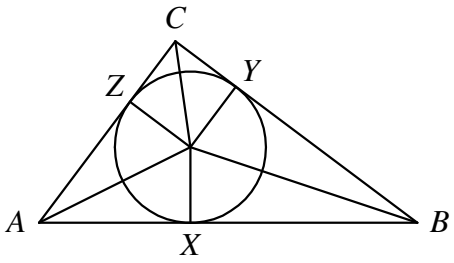
54.



In the figure the circle touches the sides of ΔABC at X, Y and Z. O is the centre of the circle. Which of the following must be true?

I. OA bisects $\angle BAC$
II. A, X, O and Z are concyclic
III. $AX = AZ$

A. III only
B. I and II only
C. I and III only
D. II and III only
E. I, II and III